POSTED 12/30/05

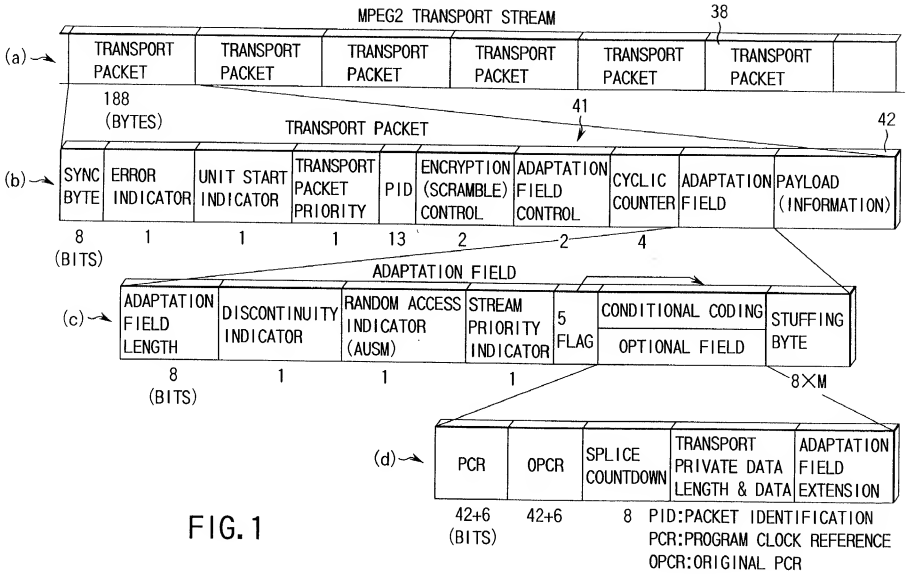

FIG. 1

OBLON, SPIVAK, ET AL
DOCKET #:204591US-2S DIV
INV: HIDEO ANDO ET AL
SHEET 1 OF 30

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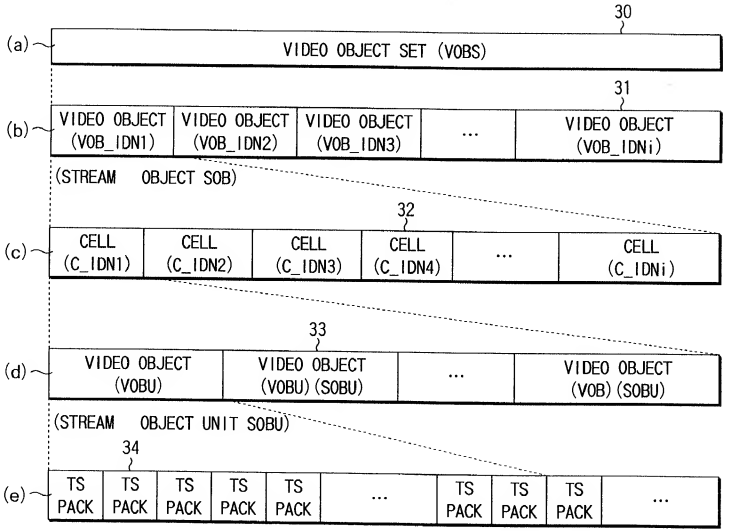


FIG. 2

OBLON, SPIVAK, ET AL
DOCKET #:204591US-2S DIV
INV.: HIDEO ANDO ET AL
SHEET 2 OF 30

OBLON, SPIVAK, ET AL
DOCKET #:204591US-2S DIV
INV: HIDEO ANDO ET AL
SHEET 3 OF 30

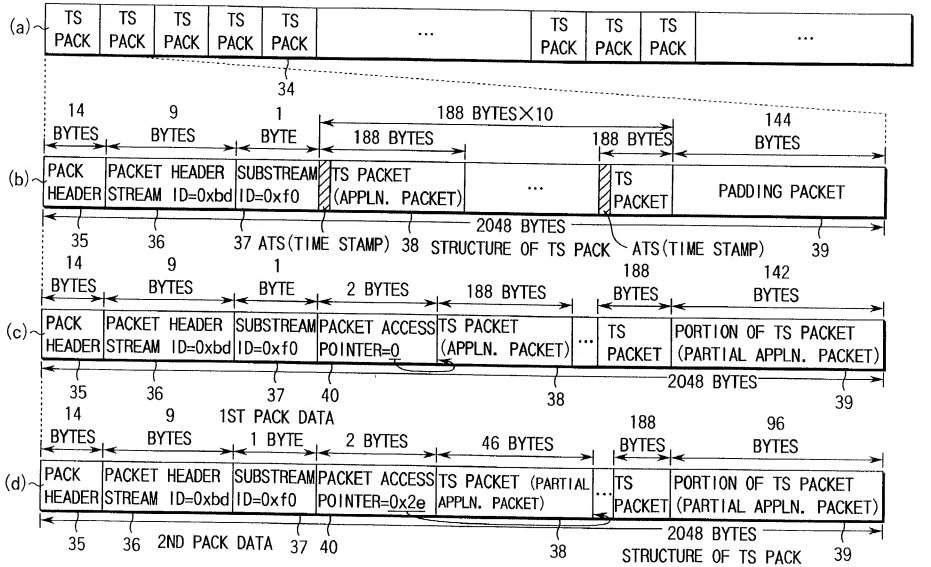


FIG. 3

OBLON, SPIVAK, ET AL
DOCKET #:20459US-2S DIV
INV: HIDEO ANDO ET AL
SHEET 4 OF 30

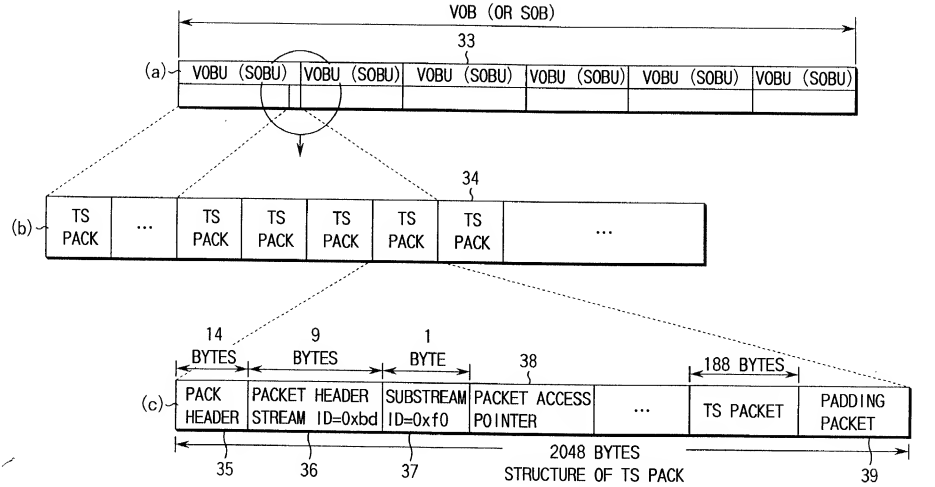
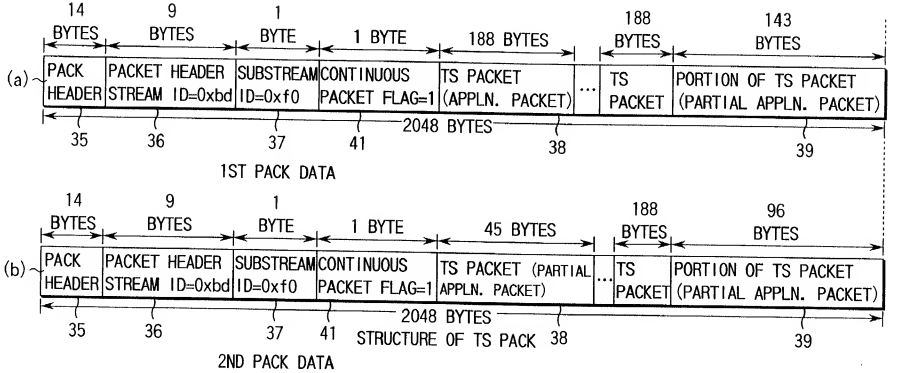


FIG. 4

OBLON, SPIVAK, ET AL
DOCKET #:20459 1US-2S DIV
INV: HIDEO ANDO ET AL
SHEET 5 OF 30

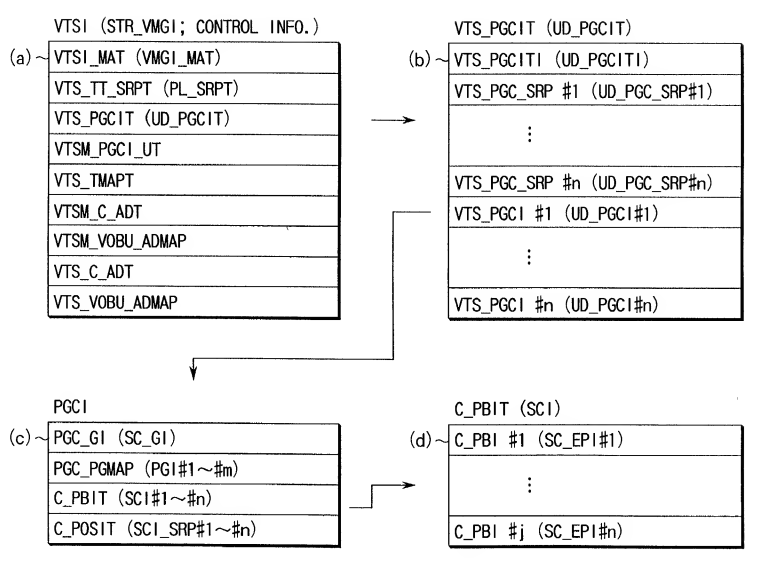


IF CONTINUOUS PACKET FLAG=1, TS PACKET EXTENDS ACROSS NEXT PACK (FROM 39 OF (a) TO 38 OF (b))

FIG. 5

OBLON, SPIVAK, ET AL
DOCKET #:204591US-2S DIV
INV: HIDEO ANDO ET AL
SHEET 6 OF 30

FIG. 6



PGC_GI (SC_GI)

(a)

	CONTENTS
PGC_CNT	NUMBER OF PROGRAMS, NUMBER OF CELLS
PGC_TRS_TM	RECORDING TIME PER PGC
SUPPORT INFO	SUPPORT INFORMATION (DETAILS ARE LISTED BELOW)
PGC_PGMAP_SA	START ADDRESS OF PROGRAM MAP
C_PBIT_SA	START ADDRESS OF C_PBIT
C_POSIT_SA	START ADDRESS OF C_POSIT
ARCHIVE FLAG (C_TY1 & TE)	ERASE INHIBITION FLAG 0: FREE, 1: SAVE PERMANENTLY
SC_EPI_Ns	NUMBER OF ENTRY POINT INFORMATION
SOB_N	STREAM OBJECT NUMBER
SC_S_APAT	STREAM CELL START APAT
SC_E_APAT	STREAM CELL END APAT
if (TE=='10b') {	
ERA_S_APAT	ERASE START APAT
ERA_E_APAT	ERASE END APAT

(b)

b7 b5	b4	b3	b2	b1	b0
IDENTIFICATION CODE OF STB THAT RECORDED DATA	SCD SUPPORT	PCR SUPPORT	PAT, PMT SUPPORT	UNIT START INDICATOR SUPPORT	RANDOM ACCESS INDICATOR SUPPORT

RANDOM ACCESS INDICATOR SUPPORT FLAG
0b···NOT SUPPORTED,
1b···SUPPORTED
UNIT START INDICATOR SUPPORT FLAG
0b···NOT SUPPORTED,
1b···SUPPORTED
PAT, PMT SUPPORT FLAG
0b···NOT SUPPORTED,
1b···SUPPORTED
PCR SUPPORT FLAG
0b···NOT SUPPORTED,
1b···SUPPORTED
SCD SUPPORT FLAG
0b···NOT SUPPORTED,
1b···SUPPORTED
PCR=PRESENTATION CLOCK REFERENCE
SCD=SPLICE COUNTDOWN

STB IDENTIFICATION CODE
001:STB OF BS DIGITAL BROADCAST
010:Ver2 STB OF DirecTV
011:Ver1 STB OF SKY PERFECT TV
C_TY1···'010b' SHALL BE DESCRIBED FOR ALL STREAM CELLS
TE···'00b':THIS CELL IS IN THE "NORMAL" STATE
'01b':THIS CELL IS IN "TEMPORARILY ERASED" STATE; AND THIS CELL STARTS AFTER THE FIRST APPLICATION PACKET OF A SOBU AND ENDS BEFORE THE LAST APPLICATION PACKET OF THE SAME SOBU
'10b':THIS CELL IS IN "TEMPORARILY ERASED" STATE; AND THIS CELL CONTAINS AT LEAST ONE SOBU BORDER (FIRST OR LAST APPLICATION PACKET OF A SOBU). ERA_S_APAT AND ERA_E_APAT EXIT FOR THIS CELL

FIG. 7

POSTED 2/25/05

C_PBI (SCI)

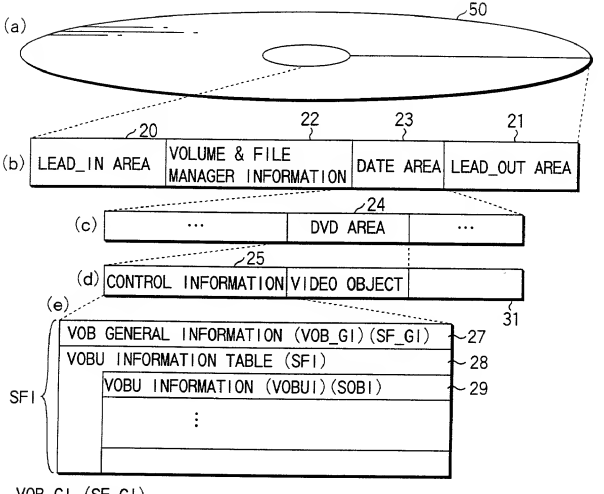
RBP		CONTENTS	NUMBER OF BYTES
0 TO 0	C_CAT (C_TY)	CELL TYPE 02: STREAMER CELL	
1 TO 4	C_ARLTM	STC VALUE OR PCR UPON RECORDING HEAD OF CELL OF INTEREST	
5 TO 8	C_FVOBU_SA	START ADDRESS OF CELL	
9 TO 12	C_LVOBU_SA	START ADDRESS OF LAST VOBU OF CELL	
13 TO 16	C_LVOBU_EA	END ADDRESS OF LAST VOBU OF CELL	
17 TO 18	TS PACKET LENGTH	TS PACKET LENGTH: NORMAL: 0xbc	
19 TO 22	REFPIC_Ns (AU_Ns)	NUMBER OF I-PICTURES	
23 TO 26	REFPIC_SA_#1 (AUSM)	START ADDRESS OF I-PICTURE #1	
27 TO 30	REFPIC_EA_#1 (AUEM)	END ADDRESS OF I-PICTURE #1	
	⋮		
23+(n-1)×8	REFPIC_SA_#n (AUSM)	START ADDRESS OF I-PICTURE #n	
27+(n-1)×8	REFPIC_EA_#n (AUEM)	END ADDRESS OF I-PICTURE #n	
		TOTAL	30+(n-1)×8

AUD

REFPIC_Ns: NUMBER OF I-PICTURES ("0" IF NO RANDOM ACCESS INDICATOR IS AVAILABLE)
REFPIC_SA#n: ADDRESS OF TS PACK INCLUDING FIRST TS PACKET OF I-PICTURE #n
(TS PACK WITH ACTIVE RANDOM ACCESS INDICATOR)
REFPIC_EA#n: ADDRESS OF TS PACK INCLUDING LAST TS PACKET OF I-PICTURE #n
(TS PACK WITH ACTIVE UNIT START INDICATOR)
("0" IF NO UNIT START INDICATOR IS AVAILABLE)

FIG. 8

OBLON, SPIVAK, ET AL
DOCKET #:204591US-2S DIV
INV: HIDEO ANDO ET AL
SHEET 8 OF 30



VOB_GI (SF_GI)

(f)

RBP		CONTENTS	NUMBER OF BYTES
0 TO 3	VOBU_Ns (SOBI_Ns)	NUMBER OF VOBUs (NUMBER OF SOBIs)	4 BYTES
4 TO 7	VOBI_END ADDRESS (OR LENGTH) (SOBU_SIZ)	END ADDRESS OR LENGTH OF VOBI (NUMBER OF SECTORS PER SOBU)	4 BYTES
8 TO 8	SUPPORT INFO	SUPPORT INFORMATION	1 BYTE
9 TO 9	ARCHIVE FLAG	ERASURE INHIBITION FLAG 0: FREE, 1: SAVE PERMANENTLY	1 BYTE
		TOTAL	19 BYTES

FIG. 9

OBLON, SPIVAK, ET AL
DOCKET #:20459IUS-2S DIV
INV: HIDEO ANDO ET AL
SHEET 10 OF 30

VOBUI (SOBI)

RBP		CONTENTS	NUMBER OF BYTES
0 TO 3	VOBU START ADDRESS	START ADDRESS OF VOBU	
4 TO 7	VOBU END ADDRESS (OR LENGTH)	END ADDRESS OR LENGTH OF VOBU	
8 TO 11	VOBU_RECTM	STC VALUE OR PCR UPON RECORDING HEAD OF VOBU OF INTEREST	
12 TO 13	TS PACKET LENGTH	TS PACKET LENGTH: NORMAL: 0xbc	
14 TO 17	REFPIC_Ns (AU_Ns)	NUMBER OF I-PICTURES	
18 TO 21	REFPIC_SA_#1 (AUSM)	START ADDRESS OF I-PICTURE #1	
22 TO 25	REFPIC_EA_#1 (AUEM)	END ADDRESS OF I-PICTURE #1	
	⋮		
16+(n-1)×8	REFPIC_SA_#n (AUSM)	START ADDRESS OF I-PICTURE #n	
20+(n-1)×8	REFPIC_EA_#n (AUEM)	END ADDRESS OF I-PICTURE #n	
		TOTAL	25+(n-1)×8

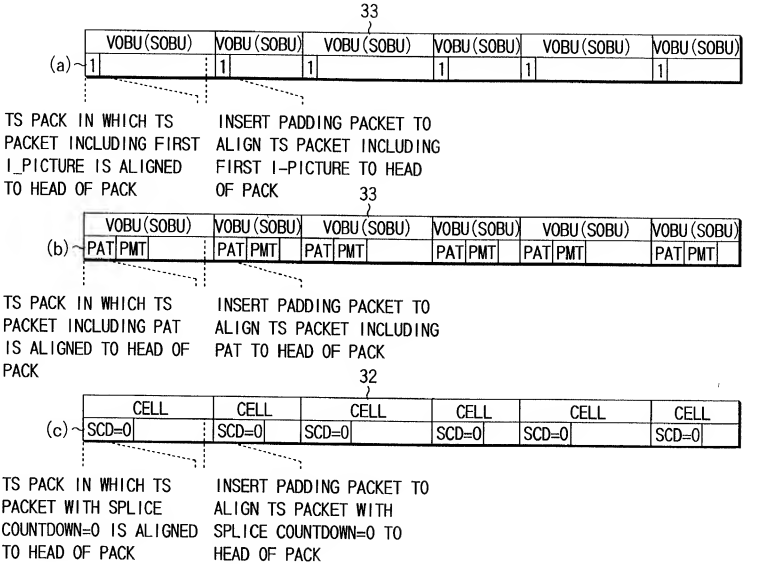
AUD

REFPIC_Ns: NUMBER OF I-PICTURES ("0" IF NO RANDOM ACCESS INDICATOR IS AVAILABLE)
REFPIC_SA#n: ADDRESS OF TS PACK INCLUDING FIRST TS PACKET OF I-PICTURE #n
(TS PACK WITH ACTIVE RANDOM ACCESS INDICATOR)
REFPIC_EA#n: ADDRESS OF TS PACK INCLUDING LAST TS PACKET OF I-PICTURE #n
(TS PACK WITH ACTIVE UNIT START INDICATOR)
("0" IF NO UNIT START INDICATOR IS AVAILABLE)

FIG. 10

OBLON, SPIVAK, ET AL
DOCKET #:204591US-2S DIV
INV: HIDEO ANDO ET AL
SHEET 11 OF 30

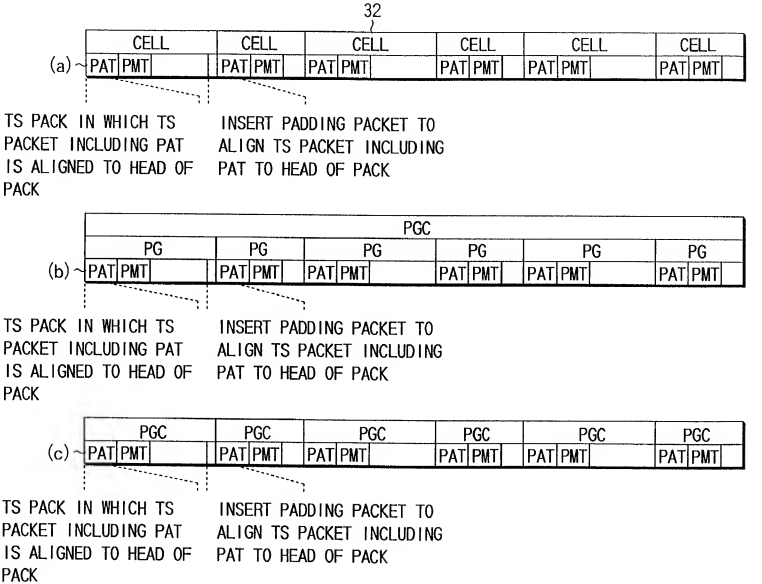
FIG. 11



POSTED 2/23/2004

OBLON, SPIVAK, ET AL
DOCKET #:204591US-2S DIV
INV: HIDEO ANDO ET AL
SHEET 12 OF 30

FIG. 12



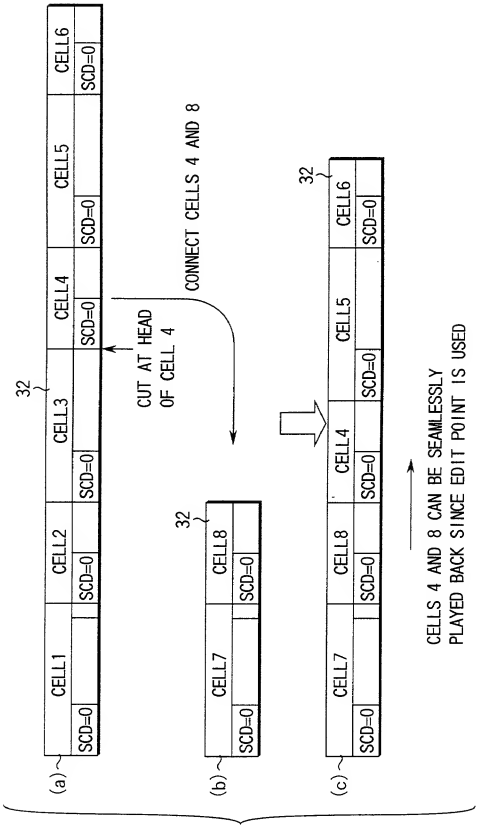

(a)
32
CELL1
CELL2
CELL3
CELL4
CELL5
CELL6
SCD=0
SCD=0
SCD=0
SCD=0
SCD=0
SCD=0
CUT AT HEAD OF CELL 4
CONNECT CELLS 4 AND 8
(b)
32
CELL7
CELL8
SCD=0
SCD=0
(c)
32
CELL7
CELL8
CELL4
CELL5
CELL6
SCD=0
SCD=0
SCD=0
SCD=0
SCD=0
CELLS 4 AND 8 CAN BE SEAMLESSLY PLAYED BACK SINCE EDIT POINT IS USED

FIG. 13

POSTED: 12/30/2004

OBLON, SPIVAK, ET AL
DOCKET #:20591US-2S DIV
INV: HIDEO ANDO ET AL
SHEET 14 OF 30

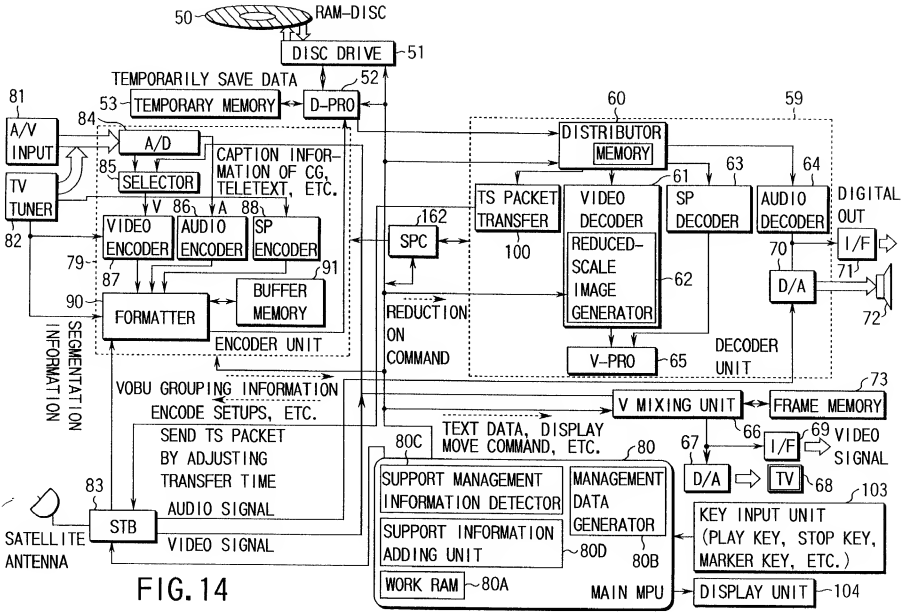


FIG. 14

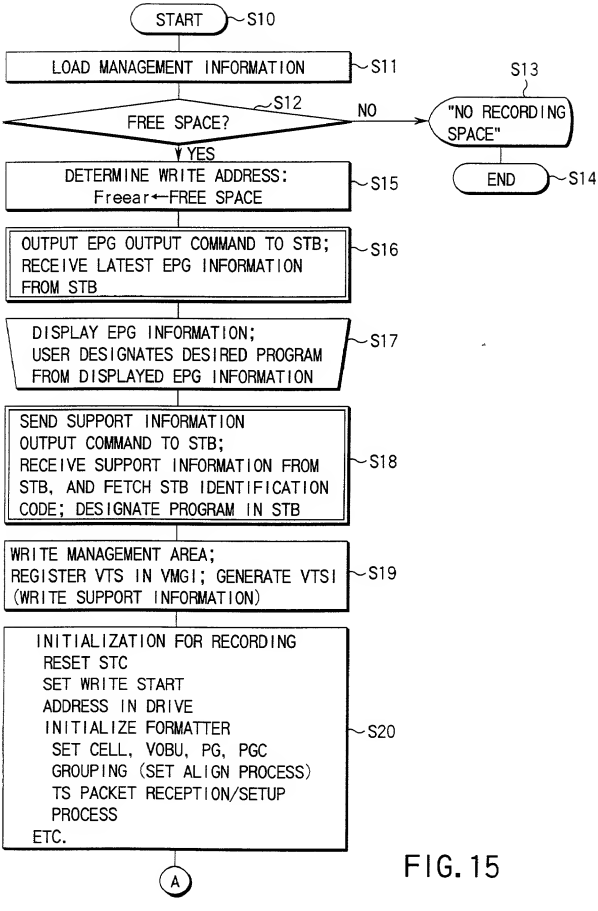

START
S10
LOAD MANAGEMENT INFORMATION
S11
FREE SPACE?
S12
NO
S13
"NO RECORDING SPACE"
END
S14
YES
DETERMINE WRITE ADDRESS: Freear←FREE SPACE
S15
OUTPUT EPG OUTPUT COMMAND TO STB; RECEIVE LATEST EPG INFORMATION FROM STB
S16
DISPLAY EPG INFORMATION; USER DESIGNATES DESIRED PROGRAM FROM DISPLAYED EPG INFORMATION
S17
SEND SUPPORT INFORMATION OUTPUT COMMAND TO STB; RECEIVE SUPPORT INFORMATION FROM STB, AND FETCH STB IDENTIFICATION CODE; DESIGNATE PROGRAM IN STB
S18
WRITE MANAGEMENT AREA; REGISTER VTS IN VMGI; GENERATE VTSI (WRITE SUPPORT INFORMATION)
S19
INITIALIZATION FOR RECORDING
RESET STC
SET WRITE START ADDRESS IN DRIVE
INITIALIZE FORMATTER
SET CELL, VOBU, PG, PGC GROUPING (SET ALIGN PROCESS)
TS PACKET RECEPTION/SETUP PROCESS
ETC.
S20
A

FIG. 15

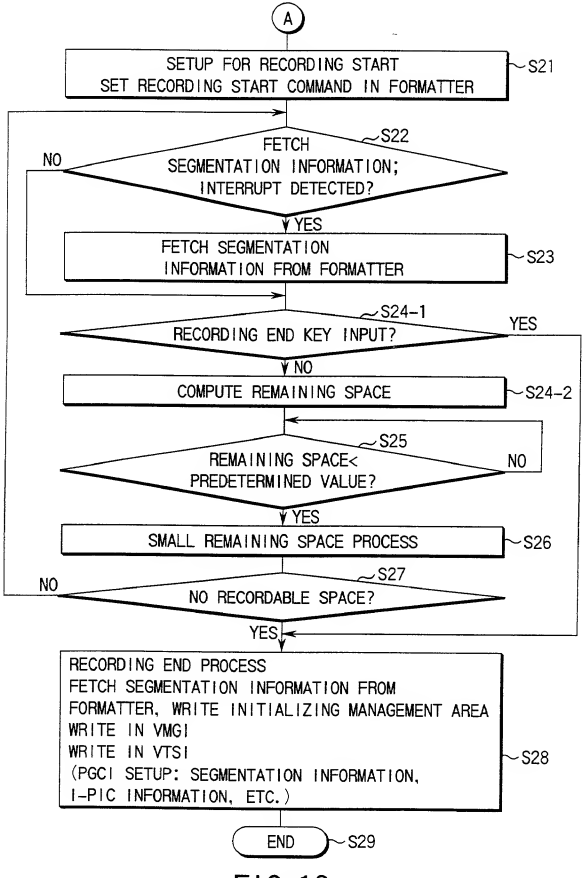

A
SETUP FOR RECORDING START
SET RECORDING START COMMAND IN FORMATTER
S21
FETCH
SEGMENTATION INFORMATION;
INTERRUPT DETECTED?
S22
NO
YES
FETCH SEGMENTATION
INFORMATION FROM FORMATTER
S23
RECORDING END KEY INPUT?
S24-1
YES
NO
COMPUTE REMAINING SPACE
S24-2
REMAINING SPACE<
PREDETERMINED VALUE?
S25
NO
YES
SMALL REMAINING SPACE PROCESS
S26
NO RECORDABLE SPACE?
S27
NO
YES
RECORDING END PROCESS
FETCH SEGMENTATION INFORMATION FROM
FORMATTER, WRITE INITIALIZING MANAGEMENT AREA
WRITE IN VMGI
WRITE IN VTSI
(PGCI SETUP: SEGMENTATION INFORMATION,
I-PIC INFORMATION, ETC.)
S28
END
S29

FIG. 16

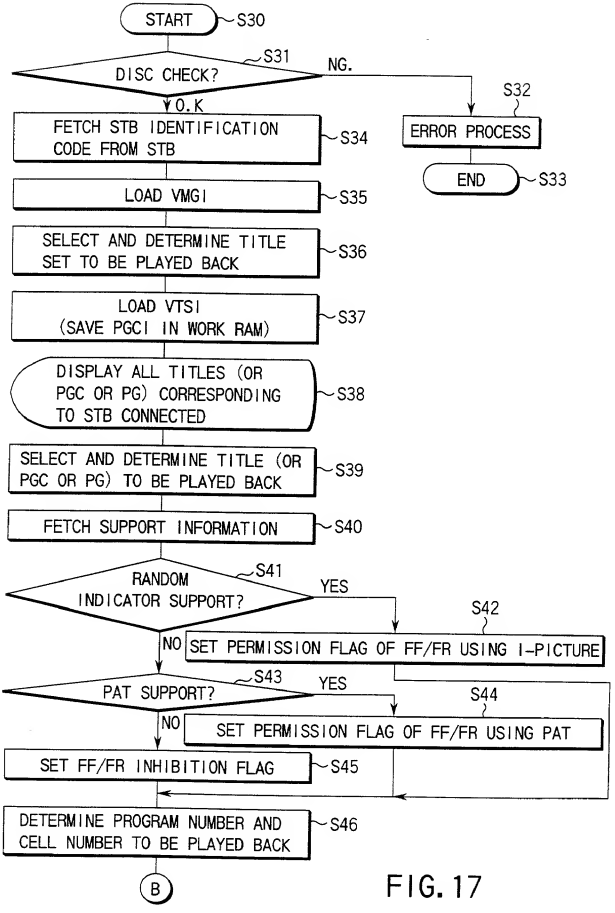

START
S30
DISC CHECK?
S31
NG.
O.K
S32
ERROR PROCESS
END
S33
FETCH STB IDENTIFICATION CODE FROM STB
S34
LOAD VMGI
S35
SELECT AND DETERMINE TITLE SET TO BE PLAYED BACK
S36
LOAD VTSI (SAVE PGCI IN WORK RAM)
S37
DISPLAY ALL TITLES (OR PGC OR PG) CORRESPONDING TO STB CONNECTED
S38
SELECT AND DETERMINE TITLE (OR PGC OR PG) TO BE PLAYED BACK
S39
FETCH SUPPORT INFORMATION
S40
RANDOM INDICATOR SUPPORT?
S41
YES
S42
NO
SET PERMISSION FLAG OF FF/FR USING I-PICTURE
PAT SUPPORT?
S43
YES
S44
NO
SET PERMISSION FLAG OF FF/FR USING PAT
SET FF/FR INHIBITION FLAG
S45
DETERMINE PROGRAM NUMBER AND CELL NUMBER TO BE PLAYED BACK
S46
B

FIG. 17

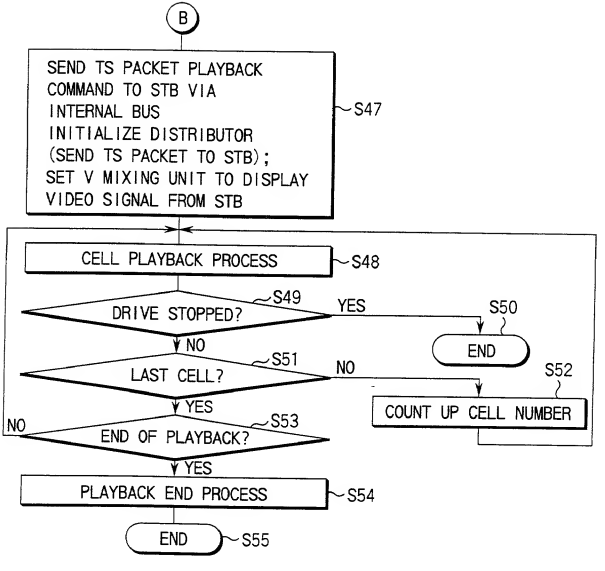

B
SEND TS PACKET PLAYBACK COMMAND TO STB VIA INTERNAL BUS INITIALIZE DISTRIBUTOR (SEND TS PACKET TO STB); SET V MIXING UNIT TO DISPLAY VIDEO SIGNAL FROM STB
S47
CELL PLAYBACK PROCESS
S48
DRIVE STOPPED?
S49
YES
S50
END
NO
LAST CELL?
S51
NO
S52
COUNT UP CELL NUMBER
YES
NO
END OF PLAYBACK?
S53
YES
PLAYBACK END PROCESS
S54
END
S55

FIG. 18

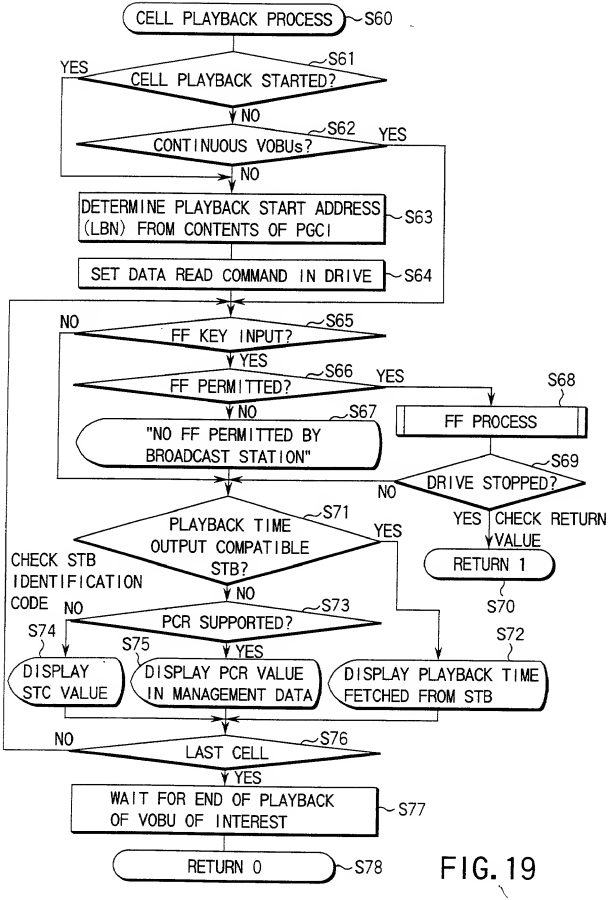

CELL PLAYBACK PROCESS
S60
S61
CELL PLAYBACK STARTED?
YES
NO
S62
CONTINUOUS VOBUs?
YES
NO
DETERMINE PLAYBACK START ADDRESS (LBN) FROM CONTENTS OF PGCI
S63
SET DATA READ COMMAND IN DRIVE
S64
NO
S65
FF KEY INPUT?
YES
S66
FF PERMITTED?
YES
NO
S67
"NO FF PERMITTED BY BROADCAST STATION"
S68
FF PROCESS
S69
DRIVE STOPPED?
NO
YES
CHECK RETURN VALUE
RETURN 1
S70
S71
PLAYBACK TIME OUTPUT COMPATIBLE STB?
YES
CHECK STB IDENTIFICATION CODE
NO
S73
PCR SUPPORTED?
NO
YES
S74
DISPLAY STC VALUE
S75
DISPLAY PCR VALUE IN MANAGEMENT DATA
S72
DISPLAY PLAYBACK TIME FETCHED FROM STB
NO
S76
LAST CELL
YES
WAIT FOR END OF PLAYBACK OF VOBU OF INTEREST
S77
RETURN 0
S78

FIG. 19

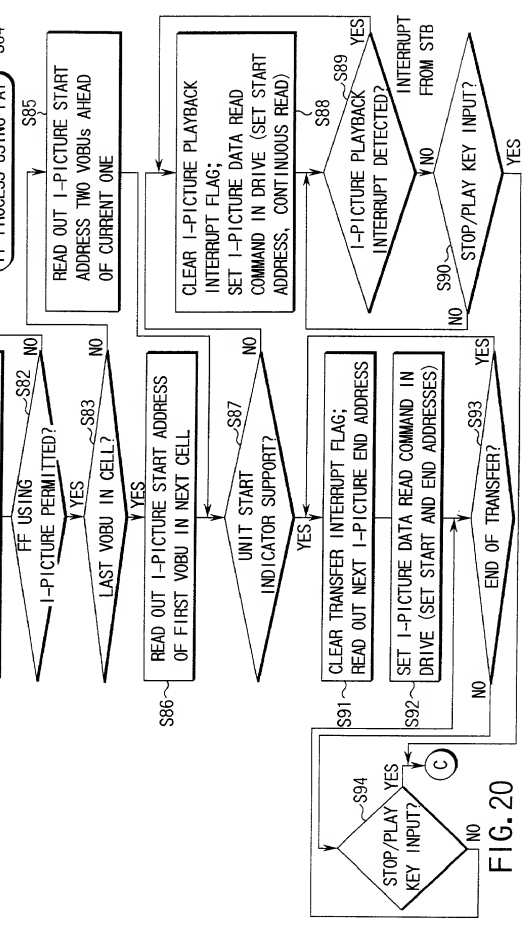

FF PROCESS
S80
SEND I-PICTURE ONLY PLAYBACK COMMAND TO STB
S81
FF USING I-PICTURE PERMITTED?
S82
NO
YES
LAST VOBU IN CELL?
S83
NO
YES
READ OUT I-PICTURE START ADDRESS OF FIRST VOBU IN NEXT CELL
S86
UNIT START INDICATOR SUPPORT?
S87
NO
YES
CLEAR TRANSFER INTERRUPT FLAG; READ OUT NEXT I-PICTURE END ADDRESS
S91
SET I-PICTURE DATA READ COMMAND IN DRIVE (SET START AND END ADDRESSES)
S92
END OF TRANSFER?
S93
NO
YES
STOP/PLAY KEY INPUT?
S94
YES
NO
C
FF PROCESS USING PAT
S84
READ OUT I-PICTURE START ADDRESS TWO VOBUs AHEAD OF CURRENT ONE
S85
CLEAR I-PICTURE PLAYBACK INTERRUPT FLAG; SET I-PICTURE DATA READ COMMAND IN DRIVE (SET START ADDRESS, CONTINUOUS READ)
S88
I-PICTURE PLAYBACK INTERRUPT DETECTED?
S89
YES
NO
INTERRUPT FROM STB
STOP/PLAY KEY INPUT?
S90
NO
YES

FIG. 20

OBLON, SPIVAK, ET AL.
DOCKET #:204591US-2S DIV
INV: HIDEO ANDO ET AL
SHEET 21 OF 30

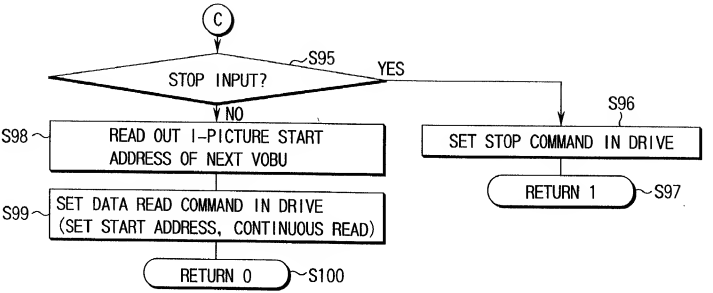


FIG. 21

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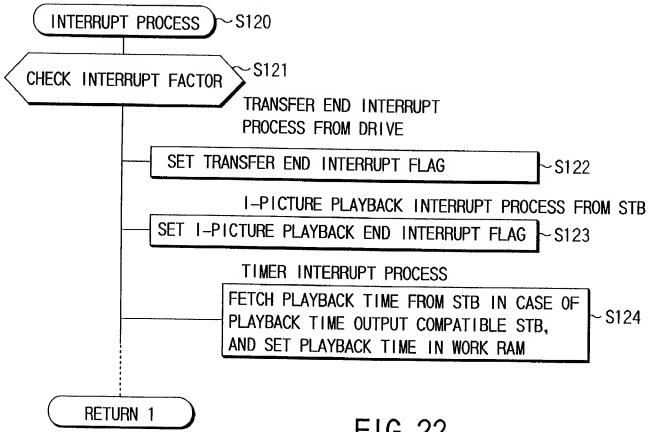

FIG. 22

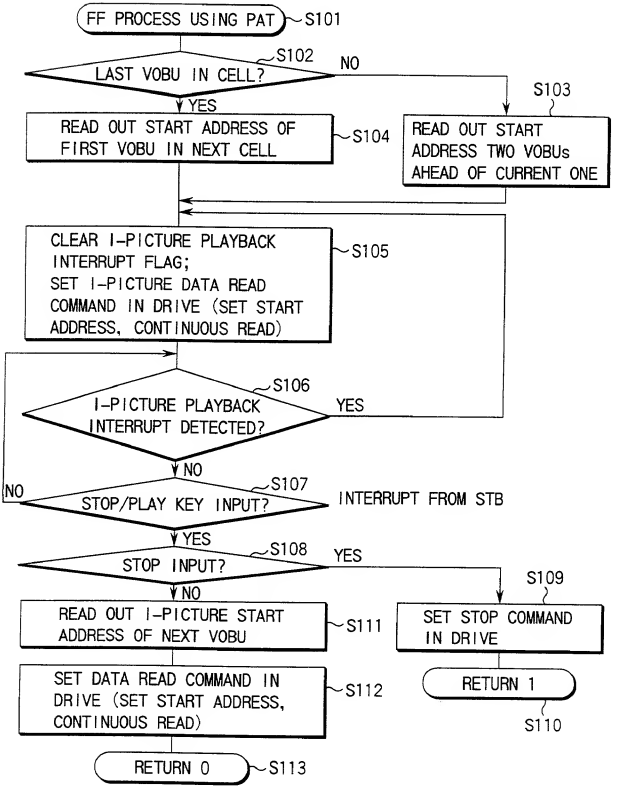
FF PROCESS USING PAT
S101
LAST VOBU IN CELL?
S102
NO
YES
S103
READ OUT START ADDRESS OF FIRST VOBU IN NEXT CELL
S104
READ OUT START ADDRESS TWO VOBUs AHEAD OF CURRENT ONE
CLEAR I-PICTURE PLAYBACK INTERRUPT FLAG; SET I-PICTURE DATA READ COMMAND IN DRIVE (SET START ADDRESS, CONTINUOUS READ)
S105
I-PICTURE PLAYBACK INTERRUPT DETECTED?
S106
YES
NO
STOP/PLAY KEY INPUT?
S107
NO
INTERRUPT FROM STB
YES
STOP INPUT?
S108
YES
S109
NO
READ OUT I-PICTURE START ADDRESS OF NEXT VOBU
S111
SET STOP COMMAND IN DRIVE
SET DATA READ COMMAND IN DRIVE (SET START ADDRESS, CONTINUOUS READ)
S112
RETURN 1
S110
RETURN 0
S113

FIG. 23

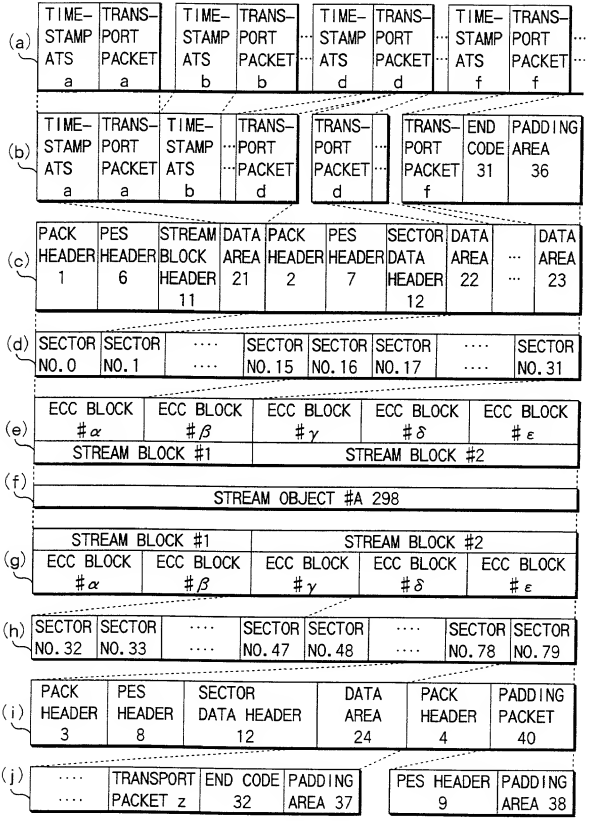
(a)
TIME-STAMP ATS a
TRANS-PORT PACKET a
TIME-STAMP ATS b
TRANS-PORT PACKET b
TIME-STAMP ATS d
TRANS-PORT PACKET d
TIME-STAMP ATS f
TRANS-PORT PACKET f
(b)
TIME-STAMP ATS a
TRANS-PORT PACKET a
TIME-STAMP ATS b
TRANS-PORT PACKET d
TRANS-PORT PACKET d
TRANS-PORT PACKET f
END CODE 31
PADDING AREA 36
(c)
PACK HEADER 1
PES HEADER 6
STREAM BLOCK HEADER 11
DATA AREA 21
PACK HEADER 2
PES HEADER 7
SECTOR DATA HEADER 12
DATA AREA 22
DATA AREA 23
(d)
SECTOR NO. 0
SECTOR NO. 1
SECTOR NO. 15
SECTOR NO. 16
SECTOR NO. 17
SECTOR NO. 31
(e)
ECC BLOCK #α
ECC BLOCK #β
ECC BLOCK #γ
ECC BLOCK #δ
ECC BLOCK #ε
STREAM BLOCK #1
STREAM BLOCK #2
(f)
STREAM OBJECT #A 298
(g)
STREAM BLOCK #1
STREAM BLOCK #2
ECC BLOCK #α
ECC BLOCK #β
ECC BLOCK #γ
ECC BLOCK #δ
ECC BLOCK #ε
(h)
SECTOR NO. 32
SECTOR NO. 33
SECTOR NO. 47
SECTOR NO. 48
SECTOR NO. 78
SECTOR NO. 79
(i)
PACK HEADER 3
PES HEADER 8
SECTOR DATA HEADER 12
DATA AREA 24
PACK HEADER 4
PADDING PACKET 40
(j)
TRANSPORT PACKET z
END CODE 32
PADDING AREA 37
PES HEADER 9
PADDING AREA 38

FIG. 24

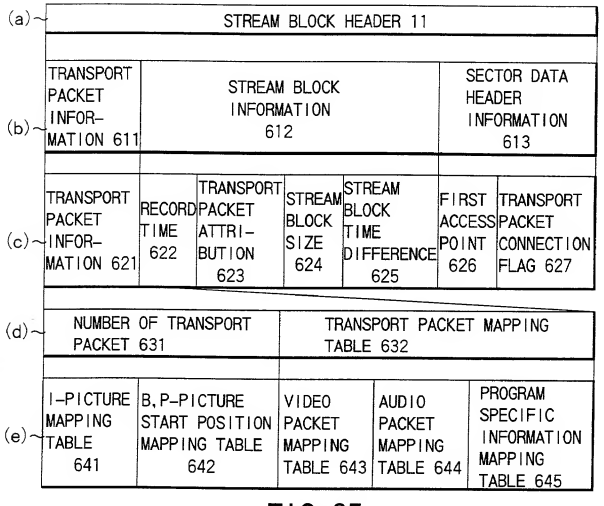

FIG. 25

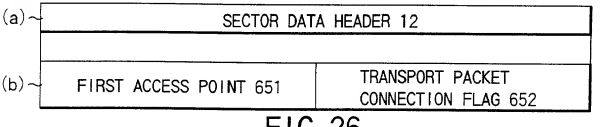

FIG. 26

CONSTRAINTS ON MPEG SPECIFICATIONS FOR SOB

SYSTEM HEADER	SHALL NOT BE INCLUDED
SCR VALUE IN THE FIRST PACK OF A SOB	ANY VALUE
MPEG PROGRAM_END_CODE	SHALL NOT BE INCLUDED
STREAM_ID	SHALL BE EQUAL TO BFh (PRIVATE_STREAM_2) IN ALL PES PACKETS

FIG. 27

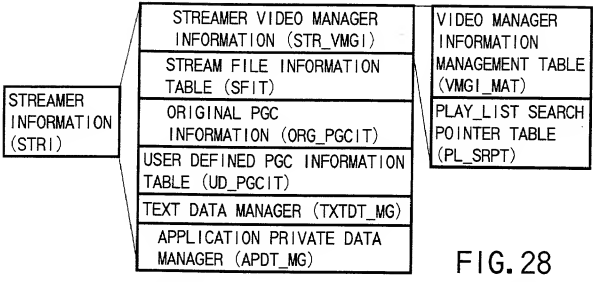

FIG. 28

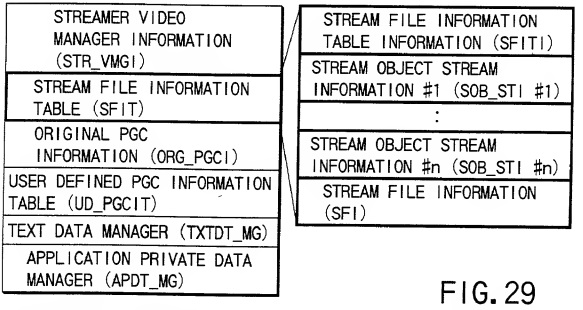

FIG. 29

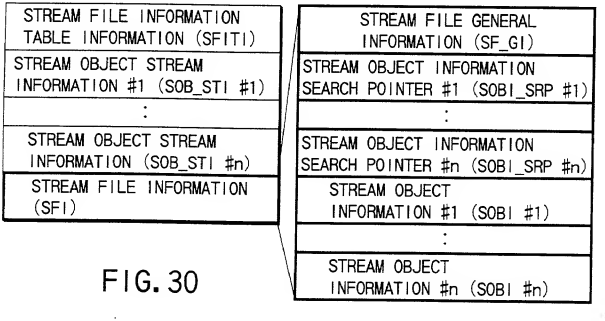

FIG. 30

STREAM FILE GENERAL INFORMATION (SF_GI)

	CONTENTS	NUMBER OF BYTES
(1) SOBI_Ns	NUMBER OF SOBIs	2
(2) SOBU_SIZ	NUMBER OF SECTORS PER SOBU	2
(3) MTU_SHFT	MAPPING TIME UNIT SHIFT	1
(4) RESERVED	RESERVED	1
	TOTAL	6

FIG. 31

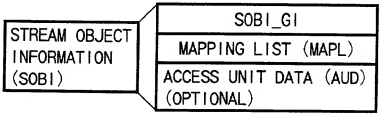

FIG. 32

STREAM OBJECT INFORMATION GENERAL INFORMATION (SOBI_GI)

	CONTENTS	NUMBER OF BYTES
(1) SOB_TY	SOB TYPE	1
(2) SOB_REC_TM	SOB RECORDING TIME	5
(3) SOB_STI_N	SOB STREAM INFORMATION NUMBER	1
(4) AUD_FLAGS	ACCESS UNIT DATA FLAGS	1
(5) SOB_S_APAT	SOB START APAT	6
(6) SOB_E_APAT	SOB END APAT	6
(7) SOB_S_SOBU	FIRST SOBU OF THIS SOB	4
(8) MAPL_ENT_Ns	NUMBER OF MAPPING LIST ENTRIES	4
	TOTAL	28

FIG. 33

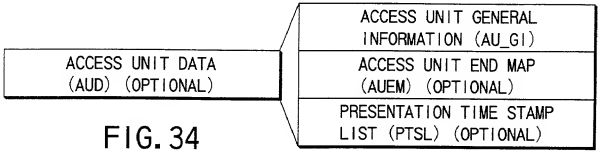

FIG. 34

ACCESS UNIT GENERAL INFORMATION (AU_GI)

	CONTENTS	NUMBER OF BYTES
(1) AU_Ns	NUMBER OF ACCESS UNITS	4
(2) AUSM	ACCESS UNIT START MAP (MAPL_ENT_Ns ELEMENTS)	(MAPL_ENT_Ns+7) div 8
	TOTAL	(MAPL_ENT_Ns+7) div 8 + 4

FIG. 35

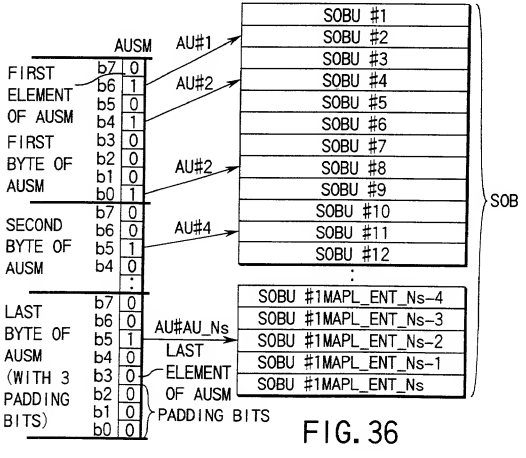

FIG. 36

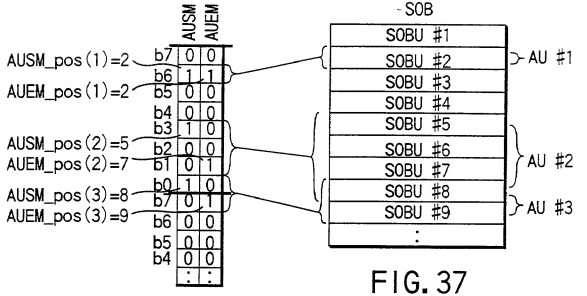

FIG. 37

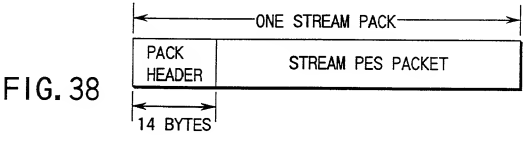

FIG. 38

STRUCTURE OF THE STREAM DATA AREA WITHIN A STREAM PES PACKET

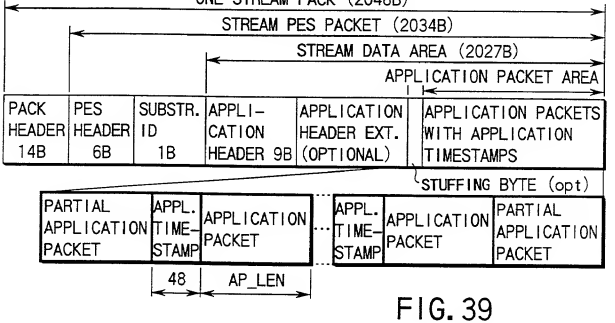

FIG. 39

APPLICATION HEADER

FIELD	NUMBER OF BITS	NUMBER OF BYTES	VALUE	COMMENT
(1) VERSION	8	1	01h	
(2) AP_Ns	8	1		
(3) FIRST_AP_OFFSET	16	2		
(4) EXTENSION_HEADER_INFO	2	1	00b, 10b, 11b	
(5) RESERVED FOR CCI_ESC	1		0b OR 1b	
(6) RESERVED	5		11111b	
(7) SERVICE_ID	16	2		
(8) MAX_BR_LOG2	8	1		
(9) SMO_BS_LOG2	8	1		
	TOTAL	9		

FIG. 40